TEN-TEC INSTRUCTION SHEET
MODEL 240

GENERAL

TEN-TEC Model 240 One-Sixty Converter is an accessory addition to the TRITON IV transceiving system which provides full TRITON transmitting and receiving capabilities for frequencies between 1.8 and 2.0 MHz. In addition, a crystal oscillator is incorporated which provides transmitting on either of two operator-selected crystal frequencies within the 160 meter band. This feature is especially useful for listening in the DX window using the VFO in the TRITON and transmitting on a selected frequency outside of the DX window.

The receiving converter consists of a crystal controlled mixer which converts the 1.8 to 2.0 MHz incoming frequency to the bottom 200 kHz of the 3.5 MHz band, i.e. 3.5 to 3.7 MHz. The transmitting section mixes the TRITON VFO output with a crystal controlled frequency so as to obtain the correct injection frequency for the transmitter mixer circuit. A low pass output filter in the antenna line is inserted when the converter is used to reduce transmitted harmonics.

INSTALLATION *

To install Model 240 into the TRITON IV system, proceed as follows:

1.) Remove dummy plug from ACCESSORIES socket on rear panel of TRITON IV.

2.) Insert plug of Model 240 into ACCESSORIES socket.

3.) Insert dummy plug into ACCESSORIES socket on rear of Model 240.

4.) Connect co-ax cable attached to Model 240 and labeled TRITON IV on rear panel to ANTENNA socket on TRITON IV.

5.) Connect small guage co-ax cable provided between CONV. OUT jack on Model 240 and REC. ANT. jack on TRITON IV.

6.) Position T/R-REC. switch on rear of TRITON IV to REC. position.

7.) If a single antenna is to be used for both transmitting and receiving, connect this antenna to ANTENNA jack on Model 240. Also position RECEIVE-TRANS slide switch to TRANS position.

8.) If separate transmitting and receiving antennas are to be used, connect the transmitting antenna to ANTENNA jack and receiving antenna to RECEIVE ANT. jack on Model 240. Position RECEIVE-TRANS switch to RECEIVE position.

9.) Attach adhesive dial scale label supplied to bottom beveled surface of TRITON dial bezel, just below dial glass, so that numerals 1.8 are immediately below the green .5 numeral on the dial glass. The 1.9 and 2.0 numerals should then fall below the green .6 and .7 numerals respectively.

* If more than one accessory is used with the TRITON, also see special instructions, Service Note SN-1-540, attached.

OPERATION

To operate transceiver on 160 meter band:

1.) Turn TRITON on and set BAND switch to 3.5 position.

2.) Set left control on Model 240 to 1.8-2.0 position.

3.) Set right control to VFO position if it is desired to utilize the TRITON VFO for both transmit and receive. If you desire to transmit on a selected crystal frequency, set control to either X-1 or

X-2 position, depending on which channel the desired crystal is inserted. (See paragraph below on crystal specifications and installation.)

4.) Operate TRITON in normal manner, using attached scale and dial skirt for frequency determination.

To operate TRITON on 10 through 80 meters:

1.) Turn left control on Model 240 to 3.5-30.0 position.

2.) Operate TRITON in normal manner.

NOTE: With MODE switch in SB-N position, the lower sideband will be utilized on 160 meters.

CRYSTAL TRANSMITTING OPERATION

One or two crystals may be added by the owner to provide crystal controlled transmissions while allowing VFO reception. The frequencies of operation can be selected anywhere in the 1.7 to 2.1 MHz segment. When using crystal control, full break-in is retained, and the lower sideband is functional in the SB-N mode. Also, the transmitting frequency in the CW modes will be approximately 750 Hz lower than the indicated crystal frequency, due to the carrier shift in this mode.

Crystal Specifications

1.) Case Size: HC-18/U
2.) Terminals: .040 inch dia. on .192 inch centers.
3.) Mode: Fundamental type only. Parallel Resonance.
4.) Load Capacitance: 32 pF.
5.) Frequency
SSB: f= Desired Operating Freq. + 9.000 MHz
CW: f= Desired Operating Freq. + 9.000750 MHz.

Crystal Installation

1.) Remove top from Model 240.

2.) Locate assembly attached to VFO-X1-X2 control and dual crystal socket on this assembly.

3.) Plug crystal for X-1 position into socket farthest from switch deck, and X-2 cystal, if used, into remaining socket.

4.) Replace top.

OPERATING HINTS

1.) Observe power and frequency limitations that may be in effect for your geographical location. If input powers below 200 watts are specified, a DC ammeter in the + 12 volt line, such as Model 207 for TEN-TEC supplies, should be used. Since supply voltage runs an average of 13.5 volts, and current to all stages except the final amplifier is 1.5 amperes, the supply current for 25 watts input to the final will be 3.4 amperes; 50 watts input will be 5.2 amperes; 100 watts input will be 9 amperes.

2.) If very strong signals are present in the 3.5 to 3.7 MHz range, they may possibly be heard when tuning 1.8 to 2.0 MHz. This is from some of the signal being fed from the antenna circuit directly around the converter mixer due to unavoidable switch capacity. To easily determine if a signal being received is an 80 meter signal instead of a 160 meter signal, momentarily switch Model 240 frequency control to the 3.5-30.0 position. If signal remains but at a much higher strength, it is an 80 meter signal. If it disappears, it is a 160 meter signal.

SYSTEM	JUMPERS REQUIRED	LOCATION OF JUMPERS	LOCATION OF DUMMY PLUG	NOTE
TRITON alone	2 to 5 *	Dummy Plug	TRITON	
TRITON to Model 240	2 to 5 * 6 to 7 to 8	Dummy Plug	Model 240	
TRITON to Model 241	6 to 7	241 Plug **	Not Used	Co-ax to Pin 6 Co-ax to Pin 8
TRITON to Model 242	6 to 7	Dummy Plug	Model 242	VFO Mod. Required
TRITON to Model 244	2 to 5 * 6 to 7 to 8	244 Plug	Not Used	C0-ax to Pin 6
TRITON to Model 240 Model 241	6 to 7	241 Plug **	Not Used	Co-ax to Pin 6 Co-ax to Pin 8
TRITON to Model 240 Model 242	6 to 7	Dummy Plug	Model 242	VFO Mod. Required
TRITON to Model 240 Model 244	2 to 5 * 6 to 7 to 8	244 Plug **	Not Used	Co-ax to Pin 6
TRITON to Model 242 Model 244	6 to 7	244 Plug **	Not Used	VFO Mod. Required Co-ax to Pin 6
TRITON to Model 240 Model 242 Model 244	6 to 7	244 Plug **	Not Used	VFO Mod. Required Co-ax to Pin 6

* Pins 2 to 5 if VFO modification has been made. Pins 4 to 5 if modification has not been made.

** Other wires and/or cables may be connected to pins 6, 7 and 8 which should not be changed.

TEN-TEC INSTRUCTION SHEET
MODEL 240

GENERAL

TEN-TEC Model 240 One-Sixty Converter is an accessory addition to the TRITON IV transceiving system which provides full TRITON transmitting and receiving capabilities for frequencies between 1.8 and 2.0 MHz. In addition, a crystal oscillator is incorporated which provides transmitting on either of two operator-selected crystal frequencies within the 160 meter band. This feature is especially useful for listening in the DX window using the VFO in the TRITON and transmitting on a selected frequency outside of the DX window.

The receiving converter consists of a crystal controlled mixer which converts the 1.8 to 2.0 MHz incoming frequency to the bottom 200 kHz of the 3.5 MHz band, i.e. 3.5 to 3.7 MHz. The transmitting section mixes the TRITON VFO output with a crystal controlled frequency so as to obtain the correct injection frequency for the transmitter mixer circuit. A low pass output filter in the antenna line is inserted when the converter is used to reduce transmitted harmonics.

INSTALLATION *

To install Model 240 into the TRITON IV system, proceed as follows:

1.) Remove dummy plug from ACCESSORIES socket on rear panel of TRITON IV.

2.) Insert plug of Model 240 into ACCESSORIES socket.

3.) Insert dummy plug into ACCESSORIES socket on rear of Model 240.

4.) Connect co-ax cable attached to Model 240 and labeled TRITON IV on rear panel to ANTENNA socket on TRITON IV.

5.) Connect small guage co-ax cable provided between CONV. OUT jack on Model 240 and REC. ANT. jack on TRITON IV.

6.) Position T/R-REC. switch on rear of TRITON IV to REC. position.

7.) If a single antenna is to be used for both transmitting and receiving, connect this antenna to ANTENNA jack on Model 240. Also position RECEIVE-TRANS slide switch to TRANS position.

8.) If separate transmitting and receiving antennas are to be used, connect the transmitting antenna to ANTENNA jack and receiving antenna to RECEIVE ANT. jack on Model 240. Position RECEIVE-TRANS switch to RECEIVE position.

9.) Attach adhesive dial scale label supplied to bottom beveled surface of TRITON dial bezel, just below dial glass, so that numerals 1.8 are immediately below the green .5 numeral on the dial glass. The 1.9 and 2.0 numerals should then fall below the green .6 and .7 numerals respectively.

* If more than one accessory is used with the TRITON, also see special instructions, Service Note SN-1-540, attached.

OPERATION

To operate transceiver on 160 meter band:

1.) Turn TRITON on and set BAND switch to 3.5 position.

2.) Set left control on Model 240 to 1.8-2.0 position.

3.) Set right control to VFO position if it is desired to utilize the TRITON VFO for both transmit and receive. If you desire to transmit on a selected crystal frequency, set control to either X-1 or

X-2 position, depending on which channel the desired crystal is inserted. (See paragraph below on crystal specifications and installation.)

4.) Operate TRITON in normal manner, using attached scale and dial skirt for frequency determination.

To operate TRITON on 10 through 80 meters:

1.) Turn left control on Model 240 to 3.5-30.0 position.

2.) Operate TRITON in normal manner.

NOTE: With MODE switch in SB-N position, the lower sideband will be utilized on 160 meters.

CRYSTAL TRANSMITTING OPERATION

One or two crystals may be added by the owner to provide crystal controlled transmissions while allowing VFO reception. The frequencies of operation can be selected anywhere in the 1.7 to 2.1 MHz segment. When using crystal control, full break-in is retained, and the lower sideband is functional in the SB-N mode. Also, the transmitting frequency in the CW modes will be approximately 750 Hz lower than the indicated crystal frequency, due to the carrier shift in this mode.

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3.) Mode: Fundamental type only. Parallel Resonance.
4.) Load Capacitance: 32 pF.
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SSB: f= Desired Operating Freq. + 9.000 MHz
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Crystal Installation

1.) Remove top from Model 240.

2.) Locate assembly attached to VFO-X1-X2 control and dual crystal socket on this assembly.

3.) Plug crystal for X-1 position into socket farthest from switch deck, and X-2 cystal, if used, into remaining socket.

4.) Replace top.

OPERATING HINTS

1.) Observe power and frequency limitations that may be in effect for your geographical location. If input powers below 200 watts are specified, a DC ammeter in the + 12 volt line, such as Model 207 for TEN-TEC supplies, should be used. Since supply voltage runs an average of 13.5 volts, and current to all stages except the final amplifier is 1.5 amperes, the supply current for 25 watts input to the final will be 3.4 amperes; 50 watts input will be 5.2 amperes; 100 watts input will be 9 amperes.

2.) If very strong signals are present in the 3.5 to 3.7 MHz range, they may possibly be heard when tuning 1.8 to 2.0 MHz. This is from some of the signal being fed from the antenna circuit directly around the converter mixer due to unavoidable switch capacity. To easily determine if a signal being received is an 80 meter signal instead of a 160 meter signal, momentarily switch Model 240 frequency control to the 3.5-30.0 position. If signal remains but at a much higher strength, it is an 80 meter signal. If it disappears, it is a 160 meter signal.

3.) In some areas, local broadcast stations may appear in the 160 meter band. This is due to third order mixer products and the strength will depend on the broadcast station's power and your antenna gain at the interfering frequency. Particularly troublesome signals may be reduced or eliminated with a trap or high pass filter in the receiver line. A convenient access to this line is at the ANT terminal of the MIXER subassembly. See ARRL handbook for information on trap construction.

4.) When operating on 160 meters, the SWR bridge in the TRITON IV will <u>not</u> indicate accurate ratios since the bridge will be in the antenna line before the low pass filter and not on the antenna side of the filter as required. Harmonics removed by the filter are reflected back through the meter circuit and result in this erroneous reading. To check antenna match and tuner settings, use an external SWR bridge in the antenna line. The SWR bridge will operate normally for all other bands.

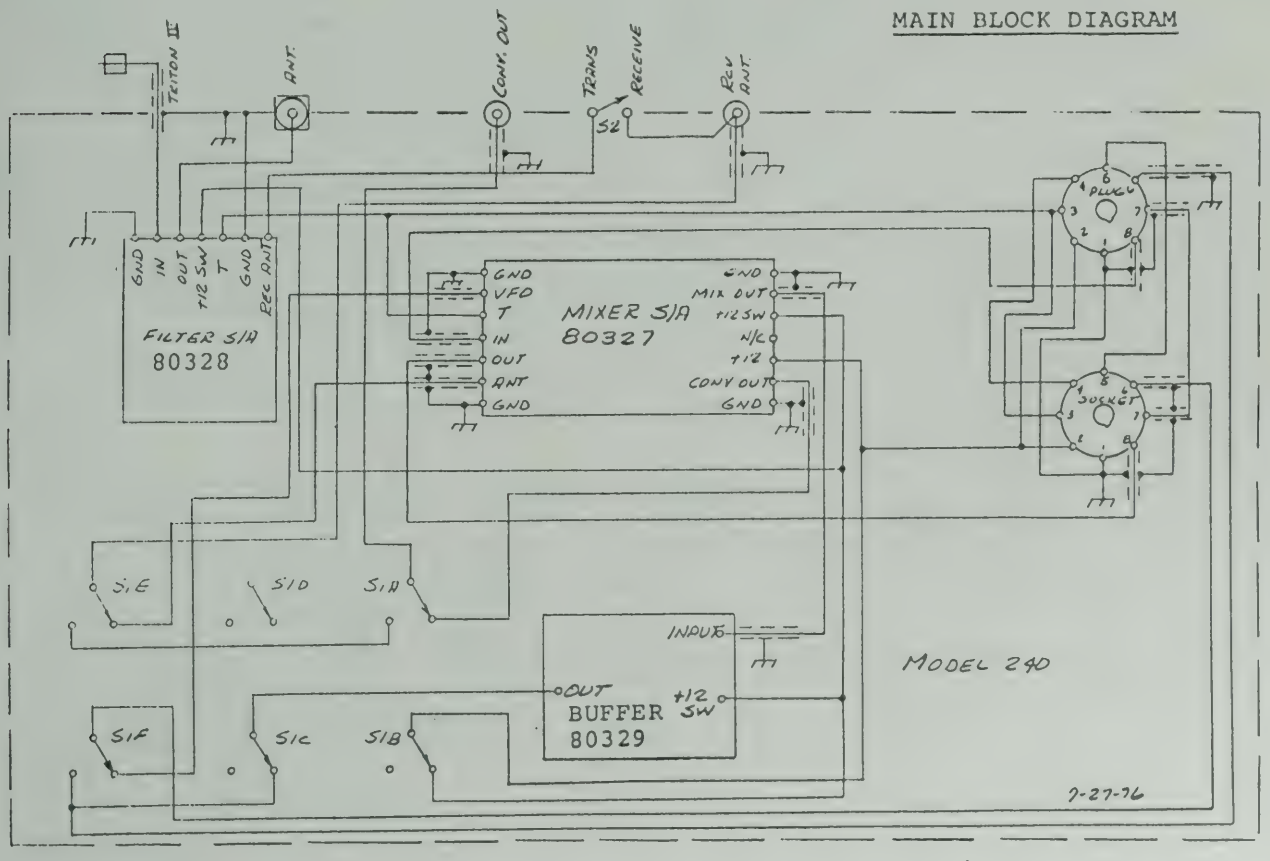
SERVICING

Model 242 consists of two plug-in circuit boards and one assembly mounted on the VFO-XTAL switch. Each assembly will be described separately, with terminal and semiconductor voltages given. The main block diagram shows interconnection of the subassemblies.

When making voltage measurements, readings should be within 15% of listed values when using a DC voltmeter with at least a 20,000 ohms-per-volt impedance. All readings are DC and positive with respect to chassis GND unless noted otherwise. Plug-in terminal locations are in the same relative position on the assemblies as noted on the schematics. If an assembly is placed component side up on the schematic in the same position as shown in the photograph, the individual terminal functions on the assembly are the same as those noted for the corresponding position in the schematic.

When removing a plug-in, note the orientation of the board so that it can be replaced correctly. Assemblies with pins on two ends can be replaced incorrectly if care is not taken. To remove plug-in, first remove the screws holding it to the sockets or chassis. Then, with long nosed pliers, work the assembly straight up and out of the sockets by pulling on the end pins in sequence.

MAIN BLOCK DIAGRAM



80327 MIXER

This assembly contains the receiving converter, a 1.7 MHz crystal oscillator whose output is fed to both the receiver and transmitter mixers, the transmitting VFO mixer and a buffer emitter follower for isolation of the TRITON VFO signal.

Incoming signals from the antenna are applied through a double tuned, overcoupled bandpass filter to one port of a diode quad mixer consisting of diodes D1 through D4. The injection signal from crystal oscillator Q2 is fed to the second port. Output frequencies which are the sum of the two inputs range between 3.5 and 3.7 MHz and are fed via the CONV. OUT terminal to the TRITON receiving antenna jack. When operating on bands other than 160 meters, the antenna is switched through S1A and S1E directly to the TRITON.

In the 160 meter transmitting mode, the same crystal oscillator feeds one input of the transmitting mixer IC-1, while the TRITON VFO feeds the second input through the VFO terminal, S1F, S1C and pin 6 of the octal socket. The dummy plug in this socket connects pins 6, 7 and 8 together. The difference output from IC-1 is selected by tuned circuits C5, C6, C7 and T1 and ranges between 10.8 and 11.0 MHz -- the proper 160 meter injection frequency for the TRITON TX-RX MIXER. When not operating on 160 meters, the TRITON VFO signal from pin 8 of the octal plug is fed directly to the TX-RX MIXER via buffer amplifier Q1, dummy plug jumper between pins 8 and 6 and switch S1F.

S1B applies power to crystal oscillator and transmitting mixer only when the 160 meter mode is switched on.

Three adjustments are located on this assembly. C19 and C20 are trimmers that adjust the double tuned antenna circuit in the receiving converter. T1 peaks the transmitter mixer output. These circuits are broad and should not require field adjustment.

Pin Voltage Readings - (Freq. switch on 1.8-2.0 position.)

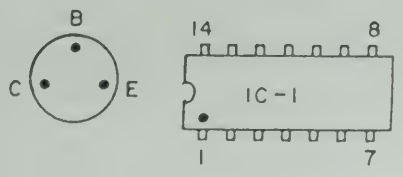
Pin	Transmit	Receive	Pin	Transmit	Receive
GND	0	0	GND	0	0
VFO	0	0	MIX OUT	5.6	5.6
T	10.4	0.2	+12 SW	13.8	13.8
IN	0	0	NC	-	-
OUT	0	0	+12	13.8	13.8
ANT	0	0	CONV OUT	0	0
GND	0	0	GND	0	0

Semiconductor Voltage Readings

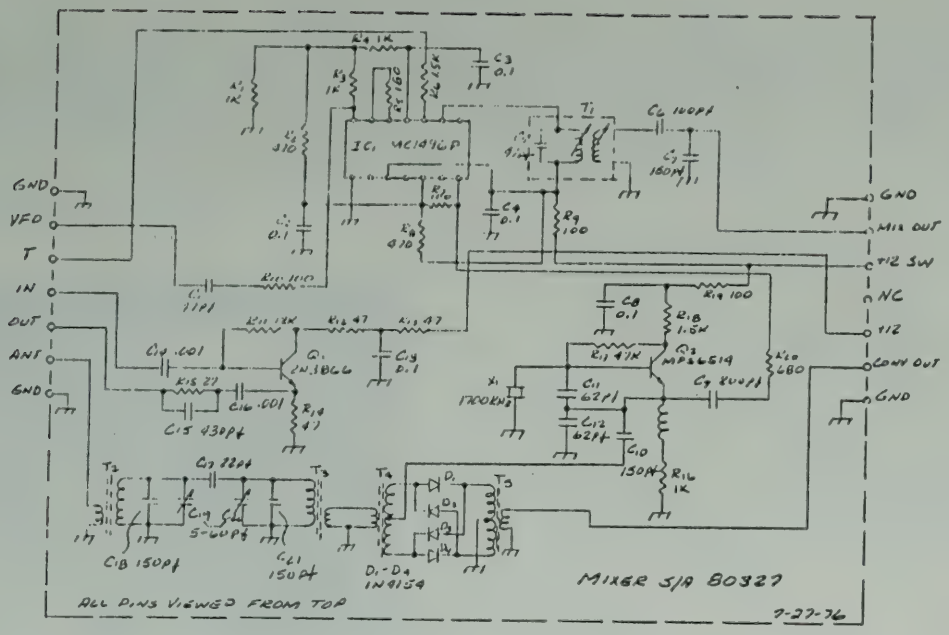
Transistor	Collector		Base		Emitter	
	Transmit	Receive	Transmit	Receive	Transmit	Receive
Q1	10.0	10.0	2.6	2.6	1.9	1.9
Q2	6.1	6.1	5.3	5.3	3.6	3.6

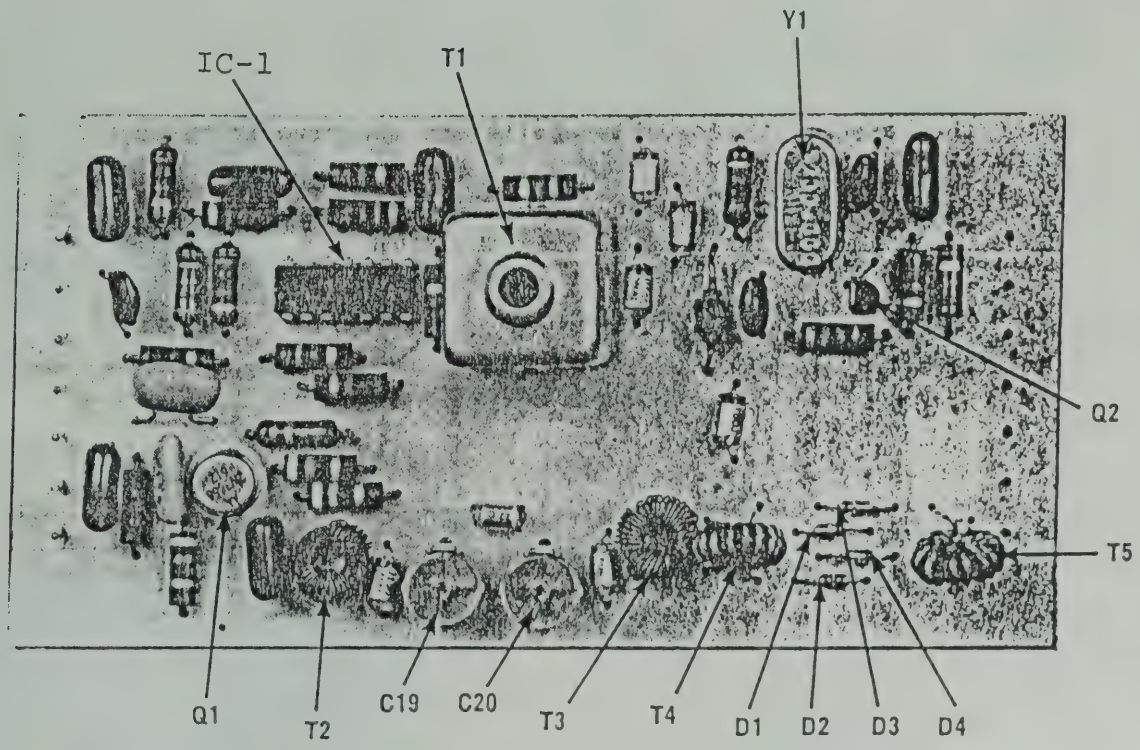
IC-1

Pin	Transmit	Pin	Transmit
1	6.1	8	9.2
2	5.4	9	-
3	5.4	10	9.2
4	6.1	11	-
5	3.1	12	12.4
6	12.6	13	-
7	-	14	0



Semiconductor pins viewed from top of PC board.



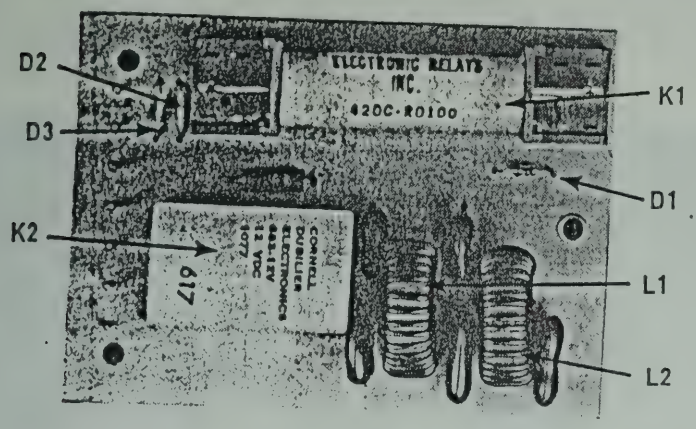


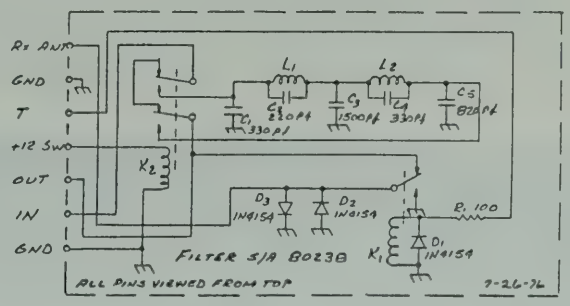
MIXER S/A 80327

80328 FILTER

This assembly contains the transmitting output low pass filter, relay K2 which switches the filter into the antenna line, and reed relay K1 which shorts the receiving antenna line to GND when transmitting on any band. Diodes D1 and D2 provide further receiver protection from high voltage rf on the antenna line.

There are no active components on this assembly and therefore no voltage measurements are required.





80329 BUFFER

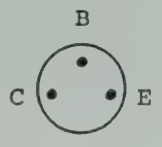
The BUFFER assembly is integral with the front panel three position switch which selects either VFO or crystal operation. This PC assembly contains a transistor stage which acts as a buffer emitter follower in the VFO mode or crystal oscillator in either X-1 or X-2 switch position. No adjustments are required on this assembly. Power is applied to the circuit through S1B only when 160 meters is being used.

Transistor voltages in transmit 160 meter mode are: (VFO mode.)

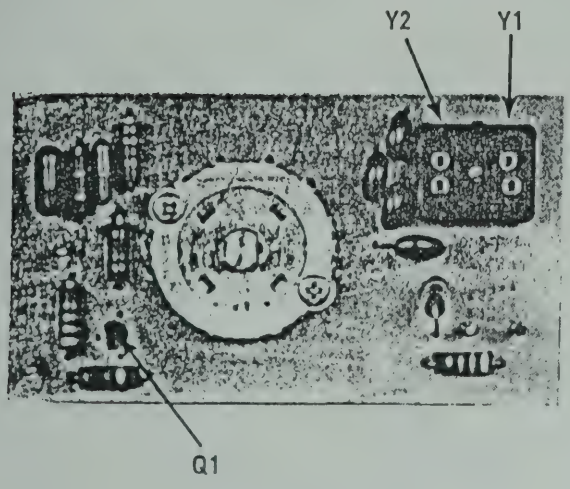
Collector= 12.1

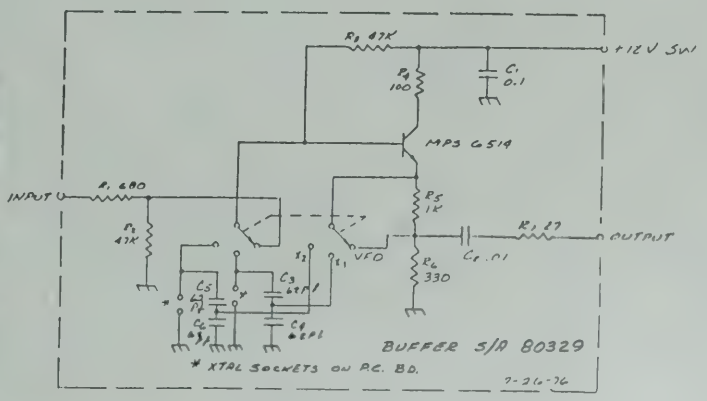
Base = 5.6

Emitter = 4.9



Transistor pins viewed from top of PC board.





The connecting cable length used with the Model 240 converter is of sufficient length to allow mounting it beside the TRITON IV.

This cable length will reduce the receiver sensitivity of the 15 meter band to .6 uV. This is caused by the reflections from the low-pass filter in the TRITON. For full sensitivity, the "TRANS-RCV" switch should be in the "TRANS" position on 15 meters.

If the "240" is placed on top of the TRITON IV and the cable length reduced to 12" or less, normal operation will result.

The power output will be approximately 75% of full rating. All functions and features, including ALC, operate properly.

GENERAL INSTRUCTIONS
TEN-TEC TRITON IV ACCESSORIES

Service Note SN-1-540

When using TRITON IV accessories that plug into the ACCESSORIES socket on the rear panel of the unit, several procedures should be followed, especially when more than one accessory are used in the station set-up. The order in which the accessories are serially connected, and the required jumpers and their location, be it on a dummy plug or in one of the cable connectors, are outlined below for all possible combinations. Accessories requiring these procedures are:

Model 240 One-Sixty Converter
Model 241 Crystal Oscillator
Model 242 External VFO
Model 244 Digital Readout

In order to simplify these procedures and instructions, it is recommended that the VFO modification detailed below be made, even though the external VFO, Model 242, is not incorporated at this time. This modification will not affect the operation of any other accessory, provided that the jumpers in the accessories used are changed to agree with the information given in this Service Note. TRITON IVs with Serial Numbers greater than 1400 already have this modification.

VFO MODIFICATION

This modification is necessary when using the external VFO, Model 242, so that the instant break-in feature of the TRITON system is maintained. Even though Model 242 may not be used at this time, performing the modification now will eliminate further alterations to the jumper positions in the future, and will bring TRITONs with S.N. below 1400 up to present day status. Modified units should be so noted by applying the adhesive label supplied to the TRITON rear panel near the ACCESSORIES socket.

1.) Remove top and bottom plates from TRITON IV.

2.) Remove SSB GEN. assembly, 80282, and bend fibre insulator up to expose cables underneath.

3.) Unsolder the three red wires that are attached to the thru-terminal on the right top side of the VFO compartment. This terminal is the one farthest to the rear of the TRITON and is the +12 volt line.

4.) Locate the one red wire that runs to the 47 ohm resistor on the terminal strip near the meter lamp. Clip this wire from the resistor.

5.) Work the remaining two wires back through the harness ties to where they emerge from under the CONTROL BOARD assembly.

6.) Twist these two leads and dress them to the 47 ohm resistor lug just mentioned. Solder.

7.) Unsolder the orange lead from the center VFO thru-terminal and resolder it to the one that had the three red leads. (This lead goes to pin 5 of the ACCESSORIES socket.)

8.) Take the discarded red lead and solder it between the center thru-terminal on the VFO compartment and the second terminal lug from the right on the front PC socket for the SSB GEN. assembly. This lug is the + regulated line and should already have an orange and a white lead in place.

9.) Lay fibre insulator back down and replace SSB GEN. assembly.

10.) Remove top plate of VFO compartment.

11.) Locate and remove red wire running from rear thru-terminal to PC assembly inside of compartment.

12.) Solder one millihenry choke between these two points. Replace top and turn TRITON over.

13.) In bottom section of VFO compartment locate and unsolder white wire going to wafer switch mounted on rear inside compartment surface.

14.) Resolder this lead to the solder dot on the center switch wafer immediately opposite the lug just vacated. In other words, transfer this lead from the rear wafer to the corresponding lug of the center wafer.

15.) With a piece of bare hook-up wire about 3/4" long, jumper the vacated lug on the rear wafer to either adjacent lug with green leads already attached. Turn TRITON right side up.

Due to the added current drain through pin 2 of the ACCESSORIES socket when several accessories are used, the voltage drop and power loss of L1, the small choke in series with the +12volt line may become excessive. The following steps rewire the circuit so that pin 2 of the socket goes directly to the power supply line instead of through L1.

16.) Locate the red lead going from pin 2 of the ACCESSORIES socket to the top lug of the four lug terminal strip mounted on the chassis side near the socket. Unsolder only this lead at the terminal lug location.

17.) Resolder this lead to the fuse post body terminal, the one with the heavy red lead going to the final amplifier assembly.

18.) Again referring to pin 2 of the ACCESSORIES socket, locate the second red lead soldered to it -- the one going through the chassis grommet to the bottom side of the chassis. Unsolder only this lead from pin 2 and feed it back through the cable tie to gain additional free length.

19.) Re-route the lead under the socket to the top lug of the terminal strip and solder.

20.) Replace top and bottom plates. Affix label noting mod. change to rear panel.

21.) If dummy plug for socket has jumper between pins 4 and 5, remove and jumper pins 2 and 5.

NOTE: To determine whether an existing TRITON IV has the VFO modification, slide back the top plate and note the wires going to the VFO thru-terminals. If a single orange lead is connected to the rear-most terminal, the modification has been made. If there are three red wires at this terminal, the modification has not been made.

IT IS VERY IMPORTANT FOR PROPER VFO OPERATION THAT PINS 4 AND 5 OF DUMMY PLUG BE JUMPERED IF MODIFICATION IS NOT INCORPORATED AND PINS 2 AND 5 IF MODIFICATION IS MADE. FAILURE TO COMPLY WILL RESULT IN UNSTABLE VFO PERFORMANCE.

INTERCONNECTING ACCESSORIES

The table below shows all possible accessory combinations that are workable as a system, the jumpers required and their location. When two or three accessories are used together, serially connect them in the same order as listed. Models 241 and 242 and Models 241 and 244 cannot be used together.

SYSTEM	JUMPERS REQUIRED	LOCATION OF JUMPERS	LOCATION OF DUMMY PLUG	NOTE
TRITON alone	2 to 5 *	Dummy Plug	TRITON	
TRITON to Model 240	2 to 5 * 6 to 7 to 8	Dummy Plug	Model 240	
TRITON to Model 241	6 to 7	241 Plug **	Not Used	Co-ax to Pin 6 Co-ax to Pin 8
TRITON to Model 242	6 to 7	Dummy Plug	Model 242	VFO Mod. Required
TRITON to Model 244	2 to 5 * 6 to 7 to 8	244 Plug	Not Used	C0-ax to Pin 6
TRITON to Model 240 Model 241	6 to 7	241 Plug **	Not Used	Co-ax to Pin 6 Co-ax to Pin 8
TRITON to Model 240 Model 242	6 to 7	Dummy Plug	Model 242	VFO Mod. Required
TRITON to Model 240 Model 244	2 to 5 * 6 to 7 to 8	244 Plug **	Not Used	Co-ax to Pin 6
TRITON to Model 242 Model 244	6 to 7	244 Plug **	Not Used	VFO Mod. Required Co-ax to Pin 6
TRITON to Model 240 Model 242 Model 244	6 to 7	244 Plug **	Not Used	VFO Mod. Required Co-ax to Pin 6

* Pins 2 to 5 if VFO modification has been made. Pins 4 to 5 if modification has <u>not</u> been made.

** Other wires and/or cables may be connected to pins 6, 7 and 8 which should not be changed.

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The receiving converter consists of a crystal controlled mixer which converts the 1.8 to 2.0 MHz incoming frequency to the bottom 200 kHz of the 3.5 MHz band, i.e. 3.5 to 3.7 MHz. The transmitting section mixes the TRITON VFO output with a crystal controlled frequency so as to obtain the correct injection frequency for the transmitter mixer circuit. A low pass output filter in the antenna line is inserted when the converter is used to reduce transmitted harmonics.

INSTALLATION *

To install Model 240 into the TRITON IV system, proceed as follows:

1.) Remove dummy plug from ACCESSORIES socket on rear panel of TRITON IV.

2.) Insert plug of Model 240 into ACCESSORIES socket.

3.) Insert dummy plug into ACCESSORIES socket on rear of Model 240.

4.) Connect co-ax cable attached to Model 240 and labeled TRITON IV on rear panel to ANTENNA socket on TRITON IV.

5.) Connect small guage co-ax cable provided between CONV. OUT jack on Model 240 and REC. ANT. jack on TRITON IV.

6.) Position T/R-REC. switch on rear of TRITON IV to REC. position.

7.) If a single antenna is to be used for both transmitting and receiving, connect this antenna to ANTENNA jack on Model 240. Also position RECEIVE-TRANS slide switch to TRANS position.

8.) If separate transmitting and receiving antennas are to be used, connect the transmitting antenna to ANTENNA jack and receiving antenna to RECEIVE ANT. jack on Model 240. Position RECEIVE-TRANS switch to RECEIVE position.

9.) Attach adhesive dial scale label supplied to bottom beveled surface of TRITON dial bezel, just below dial glass, so that numerals 1.8 are immediately below the green .5 numeral on the dial glass. The 1.9 and 2.0 numerals should then fall below the green .6 and .7 numerals respectively.

* If more than one accessory is used with the TRITON, also see special instructions, Service Note SN-1-540, attached.

OPERATION

To operate transceiver on 160 meter band:

1.) Turn TRITON on and set BAND switch to 3.5 position.

2.) Set left control on Model 240 to 1.8-2.0 position.

3.) Set right control to VFO position if it is desired to utilize the TRITON VFO for both transmit and receive. If you desire to transmit on a selected crystal frequency, set control to either X-1 or

X-2 position, depending on which channel the desired crystal is inserted. (See paragraph below on crystal specifications and installation.)

4.) Operate TRITON in normal manner, using attached scale and dial skirt for frequency determination.

To operate TRITON on 10 through 80 meters:

1.) Turn left control on Model 240 to 3.5-30.0 position.

2.) Operate TRITON in normal manner.

NOTE: With MODE switch in SB-N position, the lower sideband will be utilized on 160 meters.

CRYSTAL TRANSMITTING OPERATION

One or two crystals may be added by the owner to provide crystal controlled transmissions while allowing VFO reception. The frequencies of operation can be selected anywhere in the 1.7 to 2.1 MHz segment. When using crystal control, full break-in is retained, and the lower sideband is functional in the SB-N mode. Also, the transmitting frequency in the CW modes will be approximately 750 Hz lower than the indicated crystal frequency, due to the carrier shift in this mode.

Crystal Specifications

1.) Case Size: HC-18/U
2.) Terminals: .040 inch dia. on .192 inch centers.
3.) Mode: Fundamental type only. Parallel Resonance.
4.) Load Capacitance: 32 pF.
5.) Frequency
SSB: f= Desired Operating Freq. + 9.000 MHz
CW: f= Desired Operating Freq. + 9.000750 MHz.

Crystal Installation

1.) Remove top from Model 240.

2.) Locate assembly attached to VFO-X1-X2 control and dual crystal socket on this assembly.

3.) Plug crystal for X-1 position into socket farthest from switch deck, and X-2 cystal, if used, into remaining socket.

4.) Replace top.

OPERATING HINTS

1.) Observe power and frequency limitations that may be in effect for your geographical location. If input powers below 200 watts are specified, a DC ammeter in the + 12 volt line, such as Model 207 for TEN-TEC supplies, should be used. Since supply voltage runs an average of 13.5 volts, and current to all stages except the final amplifier is 1.5 amperes, the supply current for 25 watts input to the final will be 3.4 amperes; 50 watts input will be 5.2 amperes; 100 watts input will be 9 amperes.

2.) If very strong signals are present in the 3.5 to 3.7 MHz range, they may possibly be heard when tuning 1.8 to 2.0 MHz. This is from some of the signal being fed from the antenna circuit directly around the converter mixer due to unavoidable switch capacity. To easily determine if a signal being received is an 80 meter signal instead of a 160 meter signal, momentarily switch Model 240 frequency control to the 3.5-30.0 position. If signal remains but at a much higher strength, it is an 80 meter signal. If it disappears, it is a 160 meter signal.

3.) In some areas, local broadcast stations may appear in the 160 meter band. This is due to third order mixer products and the strength will depend on the broadcast station's power and your antenna gain at the interfering frequency. Particularily troublesome signals may be reduced or eliminated with a trap or high pass filter in the receiver line. A convenient access to this line is at the ANT terminal of the MIXER subassembly. See ARRL handbook for information on trap construction.

4.) When operating on 160 meters, the SWR bridge in the TRITON IV will not indicate accurate ratios since the bridge will be in the antenna line before the low pass filter and not on the antenna side of the filter as required. Harmonics removed by the filter are reflected back through the meter circuit and result in this erroneous reading. To check antenna match and tuner settings, use an external SWR bridge in the antenna line. The SWR bridge will operate normally for all other bands.

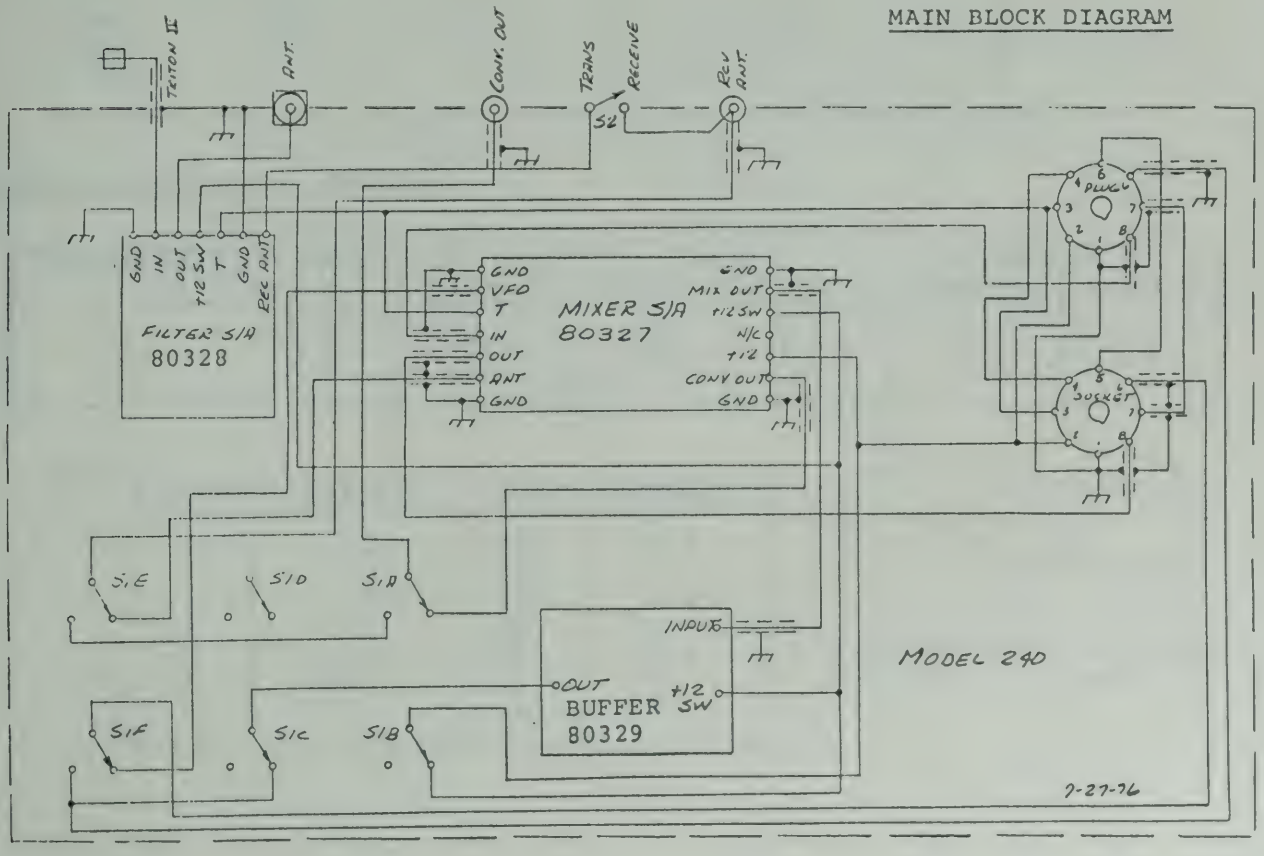
SERVICING

Model 242 consists of two plug-in circuit boards and one assembly mounted on the VFO-XTAL switch. Each assembly will be described separately, with terminal and semiconductor voltages given. The main block diagram shows interconnection of the subassemblies.

When making voltage measurements, readings should be within 15% of listed values when using a DC voltmeter with at least a 20,000 ohms-per-volt impedance. All readings are DC and positive with respect to chassis GND unless noted otherwise. Plug-in terminal locations are in the same relative position on the assemblies as noted on the schematics. If an assembly is placed component side up on the schematic in the same position as shown in the photograph, the individual terminal functions on the assembly are the same as those noted for the corresponding position in the schematic.

When removing a plug-in, note the orientation of the board so that it can be replaced correctly. Assemblies with pins on two ends can be replaced incorrectly if care is not taken. To remove plug-in, first remove the screws holding it to the sockets or chassis. Then, with long nosed pliers, work the assembly straight up and out of the sockets by pulling on the end pins in sequence.

MAIN BLOCK DIAGRAM



80327 MIXER

This assembly contains the receiving converter, a 1.7 MHz crystal oscillator whose output is fed to both the receiver and transmitter mixers, the transmitting VFO mixer and a buffer emitter follower for isolation of the TRITON VFO signal.

Incoming signals from the antenna are applied through a double tuned, overcoupled bandpass filter to one port of a diode quad mixer consisting of diodes D1 through D4. The injection signal from crystal oscillator Q2 is fed to the second port. Output frequencies which are the sum of the two inputs range between 3.5 and 3.7 MHz and are fed via the CONV. OUT terminal to the TRITON receiving antenna jack. When operating on bands other than 160 meters, the antenna is switched through S1A and S1E directly to the TRITON.

In the 160 meter transmitting mode, the same crystal oscillator feeds one input of the transmitting mixer IC-1, while the TRITON VFO feeds the second input through the VFO terminal, S1F, S1C and pin 6 of the octal socket. The dummy plug in this socket connects pins 6, 7 and 8 together. The difference output from IC-1 is selected by tuned circuits C5, C6, C7 and T1 and ranges between 10.8 and 11.0 MHz -- the proper 160 meter injection frequency for the TRITON TX-RX MIXER. When not operating on 160 meters, the TRITON VFO signal from pin 8 of the octal plug is fed directly to the TX-RX MIXER via buffer amplifier Q1, dummy plug jumper between pins 8 and 6 and switch S1F.

S1B applies power to crystal oscillator and transmitting mixer only when the 160 meter mode is switched on.

Three adjustments are located on this assembly. C19 and C20 are trimmers that adjust the double tuned antenna circuit in the receiving converter. T1 peaks the transmitter mixer output. These circuits are broad and should not require field adjustment.

Pin Voltage Readings - (Freq. switch on 1.8-2.0 position.)

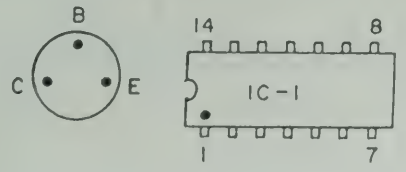
Pin	Transmit	Receive	Pin	Transmit	Receive
GND	0	0	GND	0	0
VFO	0	0	MIX OUT	5.6	5.6
T	10.4	0.2	+12 SW	13.8	13.8
IN	0	0	NC	-	-
OUT	0	0	+12	13.8	13.8
ANT	0	0	CONV OUT	0	0
GND	0	0	GND	0	0

Semiconductor Voltage Readings

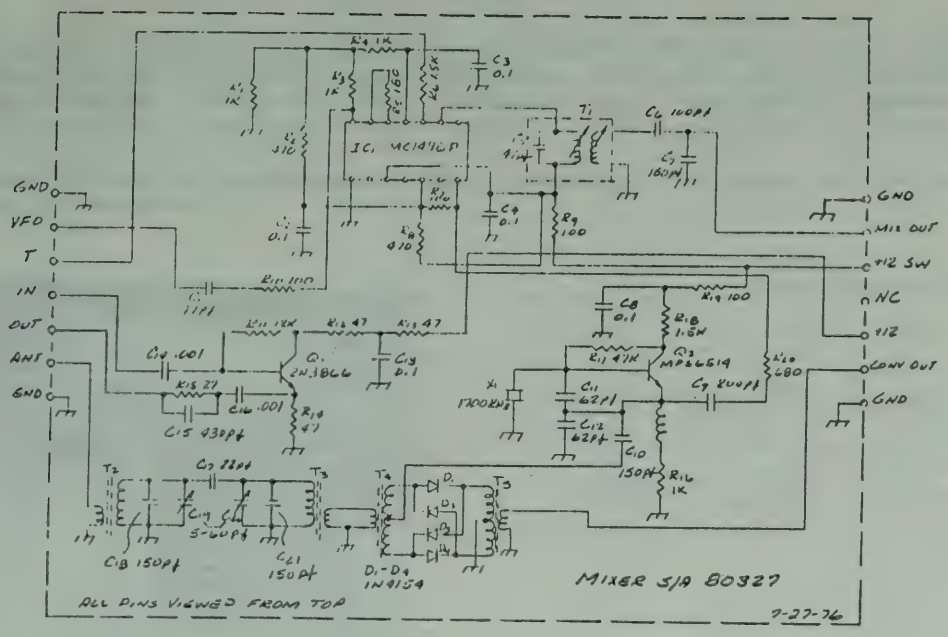
Transistor	Collector		Base		Emitter	
	Transmit	Receive	Transmit	Receive	Transmit	Receive
Q1	10.0	10.0	2.6	2.6	1.9	1.9
Q2	6.1	6.1	5.3	5.3	3.6	3.6

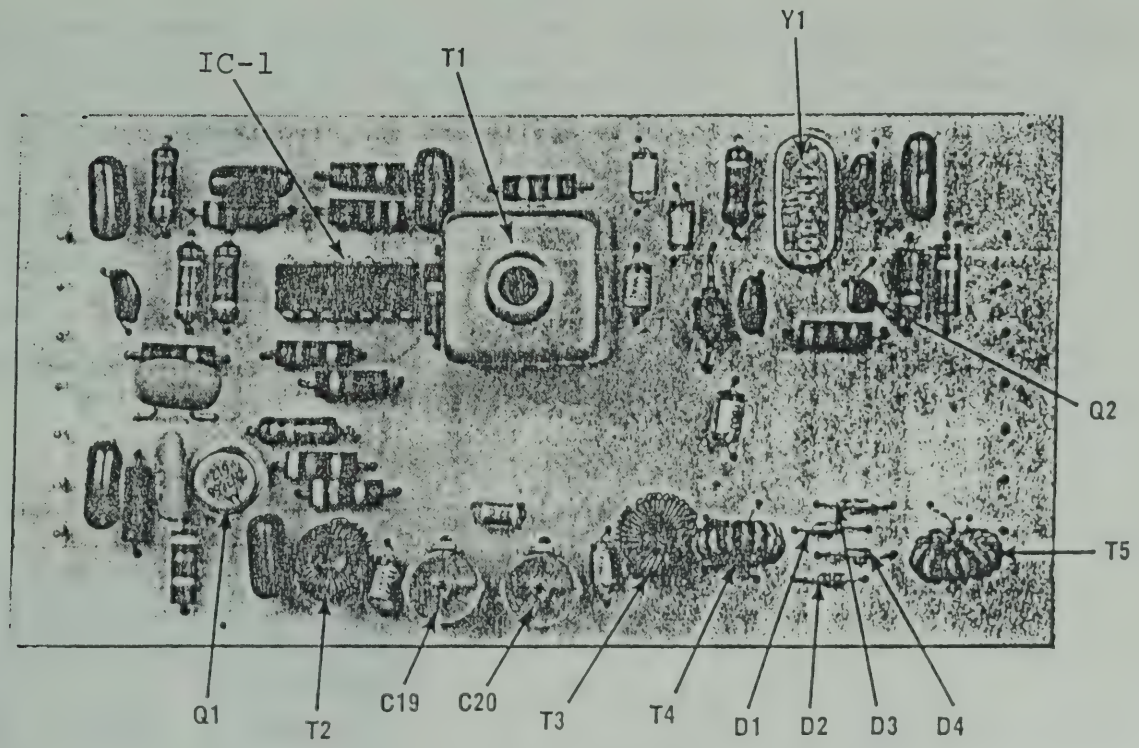
IC-1

Pin	Transmit	Pin	Transmit
1	6.1	8	9.2
2	5.4	9	-
3	5.4	10	9.2
4	6.1	11	-
5	3.1	12	12.4
6	12.6	13	-
7	-	14	0



Semiconductor pins viewed from top of PC board.





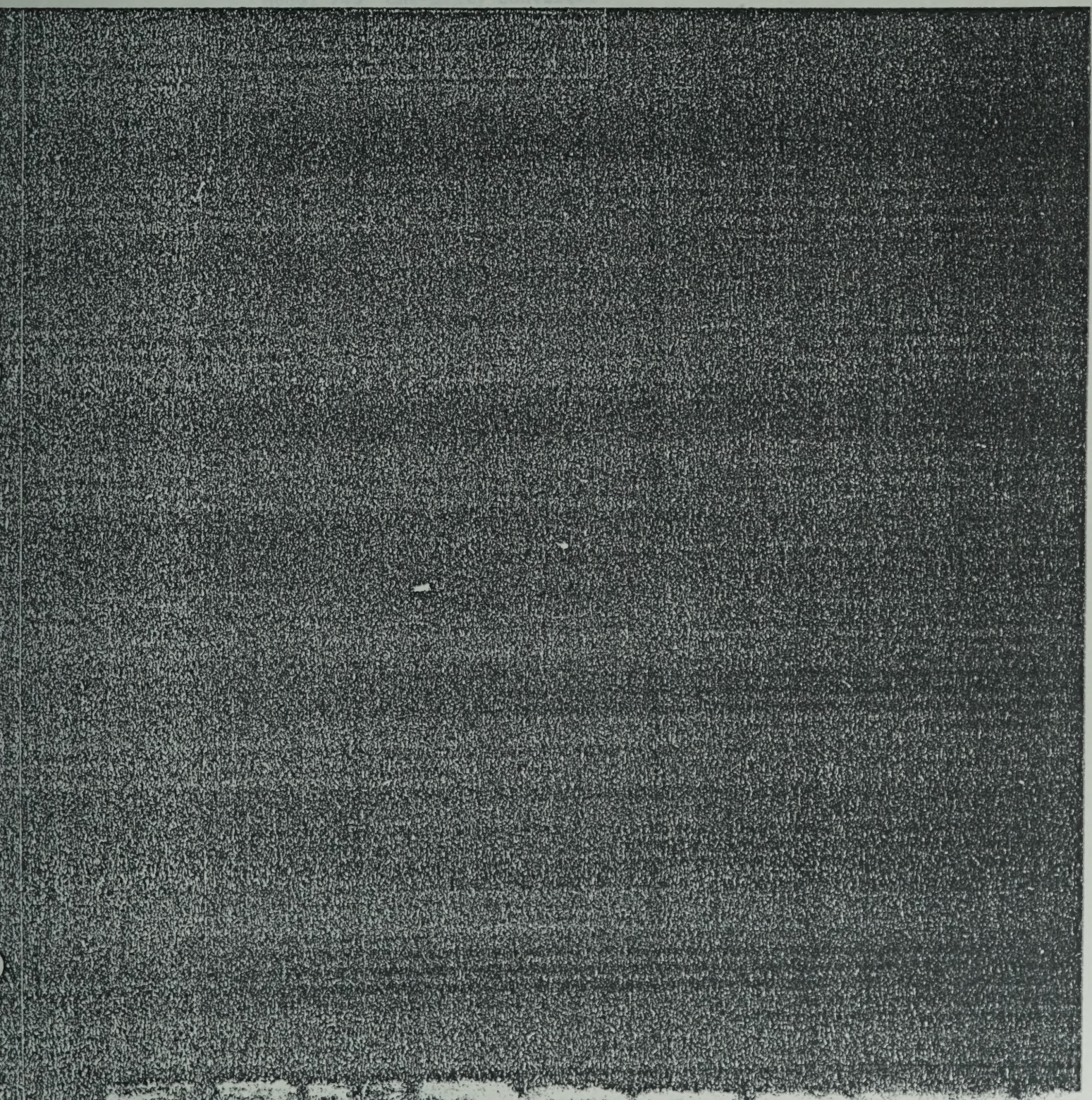
MIXER S/A 80327

The connecting cable length used with the Model 240 converter is of sufficient length to allow mounting it beside the TRITON IV.

This cable length will reduce the receiver sensitivity of the 15 meter band to .6 uV. This is caused by the reflections from the low-pass filter in the TRITON. For full sensitivity, the "TRANS-RCV" switch should be in the "TRANS" position on 15 meters.

If the "240" is placed on top of the TRITON IV and the cable length reduced to 12" or less, normal operation will result.

The power output will be approximately 75% of full rating. All functions and features, including ALC, operate properly.



10.) Remove top plate of VFO compartment.

11.) Locate and remove red wire running from rear thru-terminal to PC assembly inside of compartment.

12.) Solder one millihenry choke between these two points. Replace top and turn TRITON over.

13.) In bottom section of VFO compartment locate and unsolder white wire going to wafer switch mounted on rear inside compartment surface.

14.) Resolder this lead to the solder dot on the center switch wafer immediately opposite the lug just vacated. In other words, transfer this lead from the rear wafer to the corresponding lug of the center wafer.

15.) With a piece of bare hook-up wire about 3/4" long, jumper the vacated lug on the rear wafer to either adjacent lug with green leads already attached. Turn TRITON right side up.

Due to the added current drain through pin 2 of the ACCESSORIES socket when several accessories are used, the voltage drop and power loss of L1, the small choke in series with the +12volt line may become excessive. The following steps rewire the circuit so that pin 2 of the socket goes directly to the power supply line instead of through L1.

16.) Locate the red lead going from pin 2 of the ACCESSORIES socket to the top lug of the four lug terminal strip mounted on the chassis side near the socket. Unsolder only this lead at the terminal lug location.

17.) Resolder this lead to the fuse post body terminal, the one with the heavy red lead going to the final amplifier assembly.

18.) Again referring to pin 2 of the ACCESSORIES socket, locate the second red lead soldered to it -- the one going through the chassis grommet to the bottom side of the chassis. Unsolder only this lead from pin 2 and feed it back through the cable tie to gain additional free length.

19.) Re-route the lead under the socket to the top lug of the terminal strip and solder.

20.) Replace top and bottom plates. Affix label noting mod. change to rear panel.

21.) If dummy plug for socket has jumper between pins 4 and 5, remove and jumper pins 2 and 5.

NOTE: To determine whether an existing TRITON IV has the VFO modification, slide back the top plate and note the wires going to the VFO thru-terminals. If a single orange lead is connected to the rear-most terminal, the modification has been made. If there are three red wires at this terminal, the modification has not been made.

IT IS VERY IMPORTANT FOR PROPER VFO OPERATION THAT PINS 4 AND 5 OF DUMMY PLUG BE JUMPERED IF MODIFICATION IS NOT INCORPORATED AND PINS 2 AND 5 IF MODIFICATION IS MADE. FAILURE TO COMPLY WILL RESULT IN UNSTABLE VFO PERFORMANCE.

INTERCONNECTING ACCESSORIES

The table below shows all possible accessory combinations that are workable as a system, the jumpers required and their location. When two or three accessories are used together, serially connect them in the same order as listed. Models 241 and 242 and Models 241 and 244 cannot be used together.